Claims

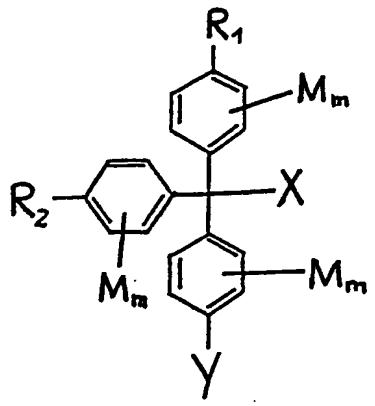
1. A process for synthesizing biopolymers by stepwise assembly from synthesis building blocks which carry protective groups, where at least one synthesis building block which carries a two-stage protective group is used, where the two-stage protective group is activated by an illumination step and eliminated by a subsequent chemical treatment step, characterized in that the activation takes place by elimination of a photoactivatable protective group which is selected from triplet-sensitized photoactivatable groups, labeled photoactivatable groups and triplet-sensitized and labeled photoactivatable groups.

2. The process as claimed in claim 1, characterized in that the chemical treatment step comprises a treatment with base, a treatment with acid, an oxidation, a reduction or/and a catalyzed, e.g. enzymatic, reaction.

3. The process as claimed in claim 2, characterized in that the chemical treatment step comprises an acid treatment.

4. The process as claimed in any of claims 1 to 3, characterized in that a derivatized trityl group is used as two-stage protective group.

5. The process as claimed in claim 4, characterized in that the synthesis building block with the two-stage protective group has the general formula (I):



(I)

where R_1 and R_2 are each independently selected from hydrogen, (L)-R_3, -O-(L)-R_3, $N(R_3)_2$, NHZ and M,

R_3 is a C_1-C_8 alkyl group, a C_2-C_8-alkenyl group, a C_2-C_8-alkynyl group, a C_6-C_{25}-aryl group or/and a C_5-C_{25}-heteroaryl group, which may optionally have substituents,

L is a linker group which is optionally present,

X is the synthesis building block,

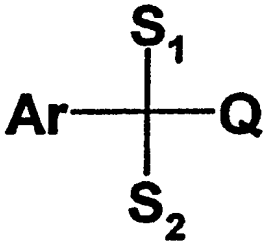
M is in each case independently a label optionally linked via a linker group, and m is in each case independently an integer from 0 to 4,

Y is in each case independently a photoactivatable protective group as claimed in claim 1,

Z is an amino protective group, and

where R_1 or/and R_2 may optionally be replaced by Y.

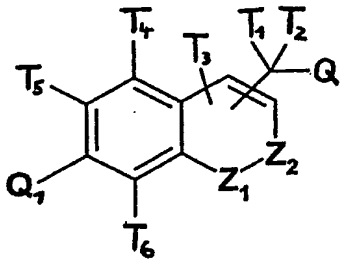
6. The process as claimed in any of claims 1 to 5, characterized in that a photoactivatable group of the general formula (II) is used



(II)

in which Ar is a fused polycyclic fluorescent aryl or heteroaryl,
S_1 and S_2 are each independently selected from hydrogen, a C_1-C_8-alkyl group, a C_2-C_8-alkenyl group, a C_2-C_8-alkynyl group, a C_6-C_{25}-aryl group or a C_5-C_{25}-heteroaryl group, each of which may optionally have substituents, and
Q is a group for linking the photolabile component to the component which can be eliminated chemically.

7. The process as claimed in any of claims 1 to 5, characterized in that a photoactivatable group of the general formula (III) is used:

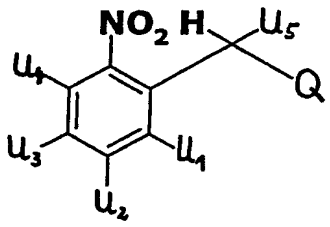


(III)

in which T_1, T_2, T_3, T_4, T_5 and T_6 are each independently selected from hydrogen, C_1-C_8-alkyl, C_2-C_8-alkenyl, C_2-C_8-alkynyl, C_1-C_8-alkoxy, C_2-C_8-alkoxycarbonyl, C_6-C_{20}-aryl or aryloxy or/and C_5-C_{25}-heteroaryl or heteroaryloxy, each of which may optionally have substituents,
and T_1 or/and T_2 may additionally be trialkylsilyl, and one of T_3 and T_4 may be NO_2, with the proviso that the other is then H,
Q_1 is hydrogen, optionally substituted C_1-C_4-alkoxy or di(C_1-C_4-alkyl)amino,
Z_1 and Z_2 together are -OC(O)-, -NT_7C(O)- or -CT_8=CT_9, where T_8 and T_9 are defined as T_3 - T_6, and T_9 may additionally be NO_2,
and adjacent groups T may optionally form a 5- or

6-membered carbocyclic or heterocyclic, saturated or unsaturated ring, and
Q is a group for linking the photolabile component to the component which can be eliminated chemically.

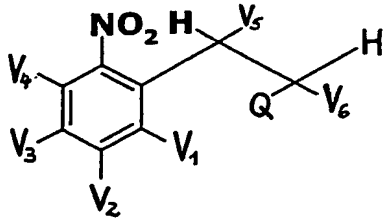
8. The process as claimed in any of claims 1 to 5, characterized in that a photoactivatable group of the general formula (IV) is used:



(IV)

in which U_1, U_2, U_4 and U_5 are each independently selected from hydrogen, halogen, NO_2, U_6, (L)-U_6, O-(L)-U_6, $N(U_6)_2$ and NHZ, U_6 is C_1-C_8-alkyl, C_2-C_8-alkenyl, C_2-C_8-alkynyl, C_6-C_{25}-aryl or C_5-C_{25}-heteroaryl, each of which may optionally have substituents, L is a linker group which is optionally present, U_3 is a label optionally linked via a linker group, and
Q is a group for linking the photolabile component to the component which can be eliminated chemically.

9. The process as claimed in any of claims 1 to 5, characterized in that a photoactivatable group of the general formula (V) is used:



(V)

in which V_1, V_2, V_3, V_4, V_5 and V_6 are each independently selected from hydrogen, halogen, NO_2, V_7, (L)-V_7, O-(L)-V_7, $N(V_7)_2$, NHZ and M, where V_7 is C_1-C_8-alkyl, C_2-C_8-alkenyl, C_2-C_8-alkynyl, C_6-C_{25}-aryl or C_5-C_{25}-heteroaryl, each of which may optionally have substituents, L is a linker group which is optionally present and V_5 and V_6 may additionally be trialkylsilyl, M is a label optionally linked via a linker group, and Q is a group for linking the photolabile component to the component which can be eliminated chemically.

10. The process as claimed in any of claims 1 to 9, characterized in that the two-stage protective group carries a plurality of labeling groups which can be detected independently of one another.

11. The process as claimed in claim 10, characterized in that a first label is linked to the photolabile component and a second label is linked to the component which can be eliminated chemically.

12. The process as claimed in any of claims 5 to 11, characterized in that the two-stage protective group comprises at least one fluorescent label.

13. The process as claimed in claim 12, characterized in that a fluorescent label is introduced on the trityl framework of a compound (I).

14. The process as claimed in any of claims 1 to 13, characterized in that the biopolymers are selected

from nucleic acids, nucleic acid analogs, peptides and saccharides.

15. The process as claimed in claim 14, characterized in that the biopolymers are selected from nucleic acids and nucleic acid analogs.

16. The process as claimed in claim 15, characterized in that phosphoramidites are used as synthesis building blocks.

17. The process as claimed in claim 16, characterized in that phosphoramidite building blocks carrying the two-stage protective group on the 5'-O atom are used.

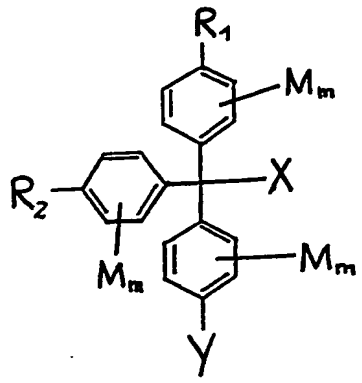
18. The process as claimed in any of claims 1 to 17, characterized in that the synthesis of the biopolymers includes the use of spacer and/or linker building blocks.

19. The process as claimed in any of claims 1 to 18, characterized in that the synthesis of the biopolymers is carried out on a solid phase.

20. The process as claimed in claim 19, characterized in that a location-dependent synthesis of a plurality of biopolymers is carried out with in each case a different sequence of synthesis building blocks on a single support.

21. The process as claimed in any of claims 1 to 20, characterized in that a synthesis building block with two-stage protective group is used for quality control.

22. Compounds of the general formula (I)



(I)

where R_1, Y, M and m are defined as in claim 1, and X is a synthesis building block or a leaving group, where R_1 or/and R_2 may optionally be replaced by Y.

23. Compounds as claimed in claim 22, characterized in that they carry a plurality of labels detectable independently of one another.

24. Compounds as claimed in claim 22 or 23, characterized in that they carry at least one fluorescent label.

25. The use of compounds of the general formula (I) as synthesis building blocks or for preparing synthesis building blocks for the synthesis of biopolymers.

26. The use as claimed in claim 25 for quality control during the synthesis of biopolymers on a solid support.